STANDARD FORM NO. 64

CONFIDENTIAL

Office Memorandum • UNITED STATES GOVERNMENT

TO : The Files

DATE: 24 March 1958

FROM : [redacted] 25X1

SUBJECT: Contract RD-107, T.O. 5 and 6 - [redacted] 25X1

1. General - A visit was made to the Electronic Park Laboratories, [redacted] on 6 March 1958 in connection with the subject task orders. Present for a discussion of the Radio Circuit Development work under Task 5 were: 25X1

[redacted] 25X1

2. Selective Calling System - Breadboard design is completed and the system was demonstrated. The system consists of a 11 digit word consisting of [redacted] 25X1
With a single clock pulse frequency the system has a capacity for 1000 calls. Keying is on/off (no tones) for CW compatibility and will work into any receiver with a BFO. The standby current drain is .25 ma. Present work involves packaging the breadboard receiving unit into a [redacted]. Delivery is scheduled for 25X1
August - on schedule. The contractor's proposal was a laboratory feasibility study which does not include the delivery of necessary hardware for the encoder. Inasmuch as laboratory feasibility appears to have been established by the equipment demonstration, it would appear desirable to package the breadboard encoding equipment (which currently includes pulse generator test equipment) for delivery, in order to conduct laboratory and operational field tests of the selective calling system. Accordingly, the contractor was requested to submit a proposal for the delivery of one prototype. Estimates were 3 months and $30,000. Work could not commence until August because of personnel assignments. What appears to be excellent design, is the work of [redacted] 25X1

3. Temperature Compensated Inductors - The company claims to have solved the problem of frequency shift over the temperature range of -40°C to +40°C. Ferrite powders with added impurities (cobalt-nickel) are fired at 1200°C. in the [redacted] ceramic laboratory. 25X1

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These cores, depending on the percentage of impurities added, have either a negative or positive temperature coefficient with a nominal inductance variation of 20% over a frequency range of 3 to 30 mc/s. (Single core). The company had plotted a curve of two cores placed together which indicated a 1% inductance change (.5% frequency change) from -40°C to +40°C.

4. Barium Titanite Tuning Capacitor - The company had to abandon the use of barium titanite as the dielectric for the receiver tuning capacitor. [redacted] explained that, in addition to mechanical handling problems, it was found that the air gap, although only microns thick, that exists between the barium titanite and a condenser plate served as a second series condenser of low value. Since the smaller of two capacitors in series exercises major control, it was found that the required calibration and resetability accuracy could not be maintained due to variations in the air gap. The barium titanite, which is also prepared in the ceramic laboratory, can be provided with any dielectric constant between 20 and 8000 with lower values showing improved temperature stability. Barium titanite with a dielectric constant of 32 has been selected for the antenna coupling network of the transmitter.

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5. All Point Tracking Tuning Condenser - As a substitute for the barium titanite tuning condenser for the receiver, the company has designed an all point tracking condenser. This condenser will have five gangs and will measure 1" x 1" x 3". The first two gangs are for the RF and mixer stages, respectively, and three separate oscillator gangs for 3 band switching. The design importance is the non-conventional shape of the oscillator plates which provide continuous, rather than conventional, 3 point tracking.

Oscillator plates

The dielectric will be a polystyrene film.

6. Liquid Dielectric Capacitor - The company is also testing a newly designed tank capacitor for the transmitter which measures 3/4" D by 3" long. The plates with an air dielectric tune from 3 to 16 mmfd and with the liquid added tune from 10 to 140 mmfd. The dielectric was new and the company had no additional information available.

7. Task Order 6 - The afternoon was devoted to discussions concerning thermocouple development and a review of general progress on both tasks. Present for a discussion of task order 6 included:

[redacted] 25X1

8. Thermoelectric Generator - The company had completed a 20 couple zinc antimide-constantan [redacted] generator. This unit 25X1
was scheduled for completion 1 February and the company was then to experiment with lead telluride. [redacted] said this was 25X1
[redacted] number 2 since the first unit had failed due to using 25X1
silicon as the insulator on the cold junction. Generator No. 2 has an epoxy resin as the cold junction insulator and has performed continuously for about a week. (Mica is used as the insulator at the hot junction). The generator was said to deliver .9 watts at .51 volts. The open circuit voltage is 1.2 volts. The delta temperature was said to be 200°C and the efficiency between 1.5 and 2%. After evacuation of the double bottom a 1/3 atmosphere of argon gas was injected to reduce the possibility of the zinc antimonide liquifying and shorting any couples.

9. Lead Telluride Generator - Inquiries were made with respect to switching from constanin to lead telluride as the thermo-negative junction. The company reported that the telluride had been received but the lead was yet to be delivered. It was apparent that progress is very slow in this area.

10. Work on the magnesium secondary battery is to be undertaken by the [redacted] and no progress 25X1
is reported.

11. Task 6 Funding - [redacted] advised that, at their 25X1
current expenditure rate of $1800 weekly, they would be without funds the first week of May 1958, and further, that they could not anticipate that the lead telluride generator could be completed before December 1958. The present task terminates 29 June 1958. The undersigned suggested that the development of a superior thermo-couple appeared to be in [redacted] interest and queried whether 25X1
[redacted] had any plans for funding the project themselves. Dr. [redacted] 25X1
said he has been trying to get such support. [redacted] said they had 25X1
a new $50,000 contract "limited" materials study.

12. Future Work - When technical discussions were terminated, [redacted] requested a conference with senior engineers to review 25X1
the present development program, in order to anticipate future work. [redacted] concern is the displacement of personnel should any 25X1
additional tasks not run concurrently. [redacted] interest, of course, 25X1
is the assignment of additional tasks, but nevertheless his point

is well taken. Deliverable items under the Radio Circuit Development task include a non-conventional receiver, transmitter, and the receiving end of a selective calling system. The contractor is aware that we will require 1 or 2 months for a laboratory evaluation of the deliverable items and that any decision regarding further development work can only be discussed after such an evaluation. [redacted] suggested a state of the art transmitter component development program similar to that undertaken for the receiver to be delivered, and expressed a desire to submit a proposal for a 3 year development to include component and circuit development. The contractor was requested to not submit such a proposal at the present time. The following actions were recommended: 25X1

a. Request a contractual overrun for necessary funds to carry the energy sources development work to the end of the present fiscal year.

b. Submit a proposal for the development completion of a lead telluride thermoelectric generator.

c. Deliver the zinc antimonide [redacted] generator to the Government as soon as possible. 25X1

d. Submit a proposal for the packaging of the encoder for the selective calling system.

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